Southeast Alaska

Cloudburst Chronicle

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National Weather Service
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In This Issue

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Aircraft Icing: A Southeast Alaska Winter Hazard

—By Brian Bezenek

One of the hazards affecting aviators over Southeast Alaska is aircraft icing. Aircraft icing is a hazard found all year long, but there can be an increased risk of it during the winter months. The risk is increased because air near the surface can be below freezing, adding a second layer of sub-freezing temperatures and another place for icing to occur.

For icing to occur, two ingredients are needed: liquid water droplets and freezing air. Liquid water can exist in sub-freezing air through a number of mechanisms: water droplets may form at temperatures below freezing if no ice crystals are present; a "warm" layer of air containing water droplets may be lifted to a level in the atmosphere that is sub-freezing; or liquid precipitation can fall into a sub-freezing layer of air, usually at or near the surface. The last two scenarios are fairly common over Southeast Alaska in the wintertime. Aircraft icing occurs when an aircraft impacts liquid droplets in sub-freezing air, freezing the droplets on contact.

The three types of icing are rime, clear, and mixed. Rime icing generally happens when small water droplets freeze instantly to the leading edges of aircraft and is typically found in stratiform cloud decks. Clear icing occurs when larger droplets of water hit and then glaze the leading edges. The droplets may spread back along the leading edges before freezing. Clear icing tends to be found in cumulus type clouds. Mixed icing is a combination of rime and clear. Generally the most severe type of icing is clear icing because it adheres to the aircraft better and can be harder to remove.

Aircraft icing is dangerous because it changes the airflow over aerodynamic surfaces. If the flow is disrupted enough, the lift may be insufficient to keep the aircraft aloft. Therefore it is important to be aware of situations in which icing is found so it can be avoided.

A key factor in avoiding icing conditions is to be familiar with where the above-freezing air is. If you encounter icing which could be dangerous to the aircraft and know where the above-freezing layer is, then you know whether to climb or descend to get out of the icing conditions. Receiving a full weather briefing before departing is an important way to get all your needed weather data. ❄

In Honor of Aimee Devaris

This newsletter is dedicated to Aimee Devaris. Congratulations to Aimee on her promotion to the Alaska Region Headquarters in Anchorage as the Public and Marine Program Manager.

Aimee became WFO Juneau's Warning Coordination Meteorologist (WCM) July 2000. Her first permanent position with the National Weather Service began in Kodiak, Alaska, the summer of 1994. Aimee's intern position continued when she joined the Juneau team in February 1995. Her dedication and diligence prevailed as she was promoted to a forecaster in the fall of 1998.

Aimee provided many intangible benefits to WFO Juneau as our WCM. A few of her tangible achievements include initiating the Spotter Network which consisted of recruiting and training 120 certified spotters. Additionally in January 2001, she inspired and guided a team of writers to develop and edit the first issue of this newsletter. In February 2001, Aimee and her Marine Services Team designed and coordinated the Mariner's Weather Guide for the Gulf of Alaska coastal waters.

We will truly miss Aimee and her hardworking, cheerful countenance. The office will have a bit less sunshine and energy with Aimee away in Anchorage. ❄

PREPARE FOR DISASTER!

–By Aimee Devaris

Winter storms, earthquakes, and tsunamis... if you're a regular reader of this newsletter, you know that each issue features some type of natural disaster applicable to Southeast Alaska. You may think this is simply a tactic to generate interest and entice folks to read on, but these articles actually serve a more noble purpose.

At the National Weather Service (NWS), we are dedicated to helping communities prepare for disaster. Why? Because ninety percent of all presidentially declared disasters are weather related, and because these events lead to around 500 deaths per year and nearly $14 billion in damage.

One of the greatest challenges in emergency preparedness is convincing people to take the threat of disaster seriously. Have you ever heard any of the following statements? "I've lived along this river for fifteen years, and it's never flooded my house." "We've never had an earthquake that strong here." "I'm an Alaskan. Winter weather doesn't slow me down." Perhaps you've made statements like this yourself. If so, you're not alone. Information gathered by the Red Cross shows that while about half (52%) of Americans think some kind of disaster can happen where they live only 12% believe it can happen to them.

The fact is, all families should have a disaster plan. It's easy... just follow these basic steps:

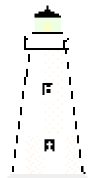
[**Gather information about hazards.** Resources are available on-line, or you can contact your local NWS office, emergency management office, or Red Cross chapter. Find out what type of disasters could occur and how you should respond. Learn your community's warning signals and evacuation plans.

[**Meet with your family and create a plan.** Discuss the information you have gathered. Pick two places to meet: a spot right outside your home for an emergency, such as a fire, and a place away from your neighborhood in case you can't return home. Choose an out-of-state friend as your family's check-in contact for everyone to call if the family gets separated. Discuss what you would do if advised to evacuate.

[**Implement your plan.** (1) Post emergency telephone numbers by phones. (2) Install safety features in your home, such as smoke detectors and fire extinguishers. (3) Inspect your home for potential hazards (such as items that can move, fall, break, or catch fire) and correct them. (4) Have your family learn basic safety measures such as CPR and first aid, how to use a fire extinguisher, and how and when to turn off water, gas and electricity in your home. (5) Teach children how and when to dial 911 or your local emergency medical services number. (6) Keep enough supplies in your home to meet your needs for at least three days. Assemble a disaster supplies kit with items you may need in case of an evacuation. Store these supplies in sturdy, easy-to-carry containers, such as backpacks or duffle bags. Keep important family documents in a waterproof container. Keep a smaller disaster supplies kit in the trunk of your car.

See PREPARE - page 4

Seafarers' Spotlight



Rogue Waves

—By Aimee Devaris

After reading a newspaper article about a rogue wave damaging a fishing vessel just outside of Sitka Sound, I thought it would be a good topic for this column. Rogue waves, sometimes referred to as "freak" waves, are generally defined as unexpectedly high waves which may come from a direction other than the prevailing sea state.

A single rogue wave can wreak havoc on even the sturdiest vessels, and our maritime history is littered with the lore and legend of these sea monsters. In 1942, the Queen Mary was struck by a mountainous wave that rolled her over. Fortunately, the ship righted herself and continued on to England. In 1965, the U.S.S. Pittsburgh lost 90 feet of her bow to a rogue wave in the North Pacific. In 1966, while crossing from Lisbon to New York, the S.S. Michelangelo was struck by an 80 foot wave that tore 30 feet of bulwark off, smashing it into the bridge and first class rooms. Every year, major ocean vessels suffer structural damage while traveling south along the standard route from the Middle East to the United States or Europe.

Because the rogue wave phenomenon is so fleeting, it is difficult to document for study and analysis. But there are several possible causes for its development which are well accepted among oceanographers and meteorologists. The most common explanation for its random occurrence is constructive interference, or the coincidence of several different wave trains meeting at the same time. In this way, the crests of the waves may be superimposed so that an extremely amplified wave results. Waves generated this way are typically short-lived since the wave trains separate as they continue to move on.

> Sea state is commonly reported in terms of significant wave height, defined as the average of the one-third highest waves.

Rogue waves may also result from the focusing of wave energy by ocean currents, such as the Gulf Stream or the Kuroshio Current. When storm forced waves or a steady ocean swell runs against a strong ocean current, unusually high waves may develop. Waves generated this way tend to be longer lived and may be very steep as the wave frequency is shortened by the current interaction.

Mariners who have experienced rogue waves often say the trough is far more sinister than the crest. Where the troughs of several wave trains coincide, the effect has been described as an "enormous hole" developing in the sea. When a ship's bow falls unexpectedly into a rogue trough, its momentum and the force of gravity can drive it downward so steeply it cannot rise over the next crest.

Rogue waves are predictable only in the sense that they are a normal part of the wave spectrum. Sea state is commonly reported in terms of significant wave height, defined as the average of the one-third highest waves. The probability of encountering a wave which is at least twice the significant height is about 1 in 1000. Certainly uncommon, but far from impossible....❄

Climatology and Observation Web Pages

–By Angel Corona

We have two areas on our website http://pajk.arh.noaa.gov that provide current and historical data. The first is the Observations Page, which allows you to see surface and buoy observations.

For surface observations, you may select a roundup of the latest observations, a 24-hour regional temperature and precipitation roundup (all co-op observer sites that report daily are here), and the road observations. There is also a map of Southeast Alaska where you may click on a site to see the current and previous 24 hours of observations for that site.

For buoy observations, you may select a roundup of the latest observations around Alaska and (See WEB - page 8)

Climate Normals to be Updated Soon

–By Robert Tschantz

The climate normals for Juneau and the remainder of Southeast Alaska will be updated soon. “Climate normals” are a 30-year average of various parameters, such as temperature, snowfall, and rainfall. These are updated every 10 years to reflect recent trends. Currently, we are using the averages from the 1961-1990 period. The updated normals will be from the 1971-2000 period. So when you hear that the temperature was 5 degrees above normal, the “normal” is the most recent update to the 30-year average. The reason that 30 years is chosen for the normal period is to allow various climate cycles to complete their course and get a better feel for the long term climate changes.

For this chart please see the following page.

The new update will reflect the warming trend that has been occurring for the past 30 years. Also, rainfall has increased somewhat in the 1971-2000 time frame, while snowfall has decreased. The accompanying chart shows how much rainfall and snowfall have changed during the last three climate normal periods at Juneau International Airport.

Meanwhile, temperatures during the past three climate normal periods have increased from an average of 40.0/ for the 1951-1980 period, to 41.5/ for the 1971-2000 period. The warming trend has been more noticeable in winter than in summer. The average temperature for the winter months (December, January, February) has increased by 2.1/from the 1951-1980 to 1971-2000 normal periods. The mean summer (June, July, August) temperature has increased by 1.1/ during the same time frame.

(**PREPARE** - Continued from page 2)

[**Practice your plan.** Ask questions and make sure your family remembers meeting places, phone numbers, and safety rules. Conduct drills. Test your smoke detectors monthly and change the batteries at least once a year. Test and recharge your fire extinguisher(s) according to manufacturer’s instructions. Replace stored water and food every six months.

A disaster supply kit should include:

- T A three-day supply of water (one gallon per person per day) and food that won’t spoil.
- T One change of clothing and footwear per person.
- T One blanket or sleeping bag per person.
- T A first aid kit, including prescription medicines.
- T Emergency tools, including a battery-powered radio, flashlight, and plenty of extra batteries.
- T An extra set of car keys and cash.
- T Special items for infant, elderly, or disabled family members.

This information came from the Red Cross, Federal Emergency Management Agency, and the National Weather Service. For more information about disaster preparedness, refer to the following websites:

www.redcross.org www.fema.gov
www.nws.noaa.gov

A personal note

After nearly seven years at the National Weather Service in Juneau, I am moving on to take a position at the Regional Headquarters office in Anchorage.

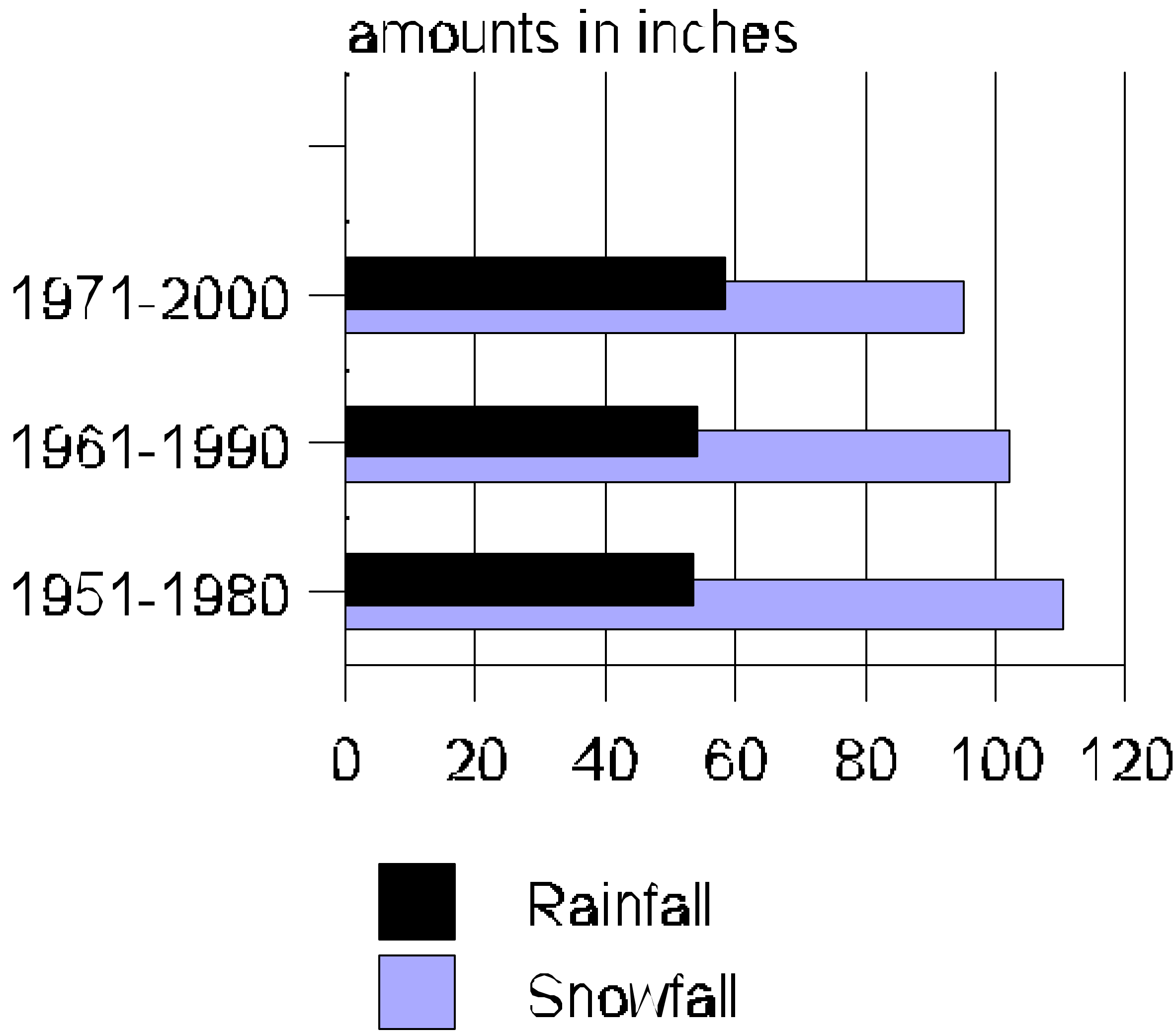
To all of our customers and partners, and especially to the volunteer weather spotters, it has been a distinct pleasure working with you. I have found the people of Southeast Alaska to be among the most weather-savvy people I have ever known. Your passion and respect for this spectacular land and the sometimes perilous weather that we face has been inspiring to me.

I know you will continue to work with the National Weather Service in support of our mission to save lives and protect property.

With sincere thanks and best wishes,

Aimee Devaris

Climate normals



Weather Watchers

Southeast's Spotter Network

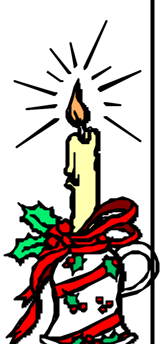
–By Aimee Devaris

LET IT SNOW! The National Weather Service in Juneau is thrilled to have 32 brand new spotters in Haines. Some have suggested that Haines may actually have more weather spotters per capita than any other community in the country! In any case, our staff is tremendously grateful for the enthusiasm for weather reporting shared by those in Haines and the rest of our Southeast Alaska spotter network. Your observations and damage reports are critical to the success of our severe weather warning program, as well as the improvement of our general weather forecasts. We greatly appreciate your participation in this program.

This fall, we received nearly 100 spotter reports from all over the Panhandle. We had thunderstorms spotted in several locations, hail reports from Saxman and Petersburg, a freezing rain report from Haines, detailed wind damage reports from Craig, Metlakatla, Skagway, and Juneau, and dozens of high wind observations. This information led to increased awareness and a better understanding of the impacts of our fall storms on various Southeast communities. Please keep up the good work, and send us your winter weather reports!

Becoming a spotter is easy! You can browse through the training information on the web, we can mail you a packet, or you can attend a short 2-hour spotter course. Courses may be scheduled in any community where there is enough interest to satisfy a minimal level of attendance (usually at least 10 people).

If you are interested in becoming a spotter, please give us a call at (907) 790-6824 or e-mail Brian.Bezenek@noaa.gov. You will also find more information on the web at http://pajk.arh.noaa.gov/spotter/spot.htm. ❄



MOST ACTIVE SPOTTER

We appreciate your time and dedication and recognize our most active spotters with special prizes and awards. This quarter, our most active spotter was Martha Reeves of Juneau with over 40 reports. We would also like to give honorable mention to John Markle of Saxman for providing 16 reports.

Martha and John will each receive a "2002 Alaska Weather Calendar" **donated by Williwaw Publishing Co.** for their efforts.

Is it Snowing at Eaglecrest?

–By Robert Kanan

When it is raining in Juneau, here is a good way to estimate if it is snowing at the Eaglecrest ski area on Douglas Island.

- If the temperature at Juneau's airport is **44°F or colder**, any precipitation at the **top** of Eaglecrest (elevation about 2600 feet) is likely to be **all snow**.
- If it is **38°F or colder**, any precipitation on the ski slope is likely to be in the form of **snow**, at least as far down as the **lodge** (elevation about 1200 feet).
- When the airport temperature is between 38°F and 44°F, there is likely to be a dividing line between the rain and snow, or mixed rain and snow, between the top and the lodge.

These rules of thumb are valid for most winter precipitation situations and can be very helpful for estimating just where the snow line may be on the Eaglecrest ski slopes.

Check the weather forecast and local conditions before you hit the slopes or the trails! ❄

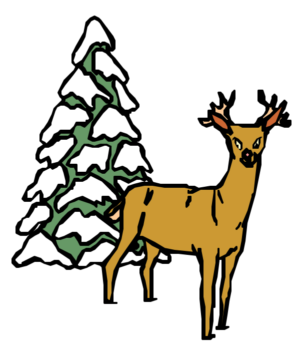
Please see Juneau Airport snowfall chart on page 6.

Juneau Airport Snowfall

October 1 – April 30 Snow Season (1943-2001)

Average 96.2 inches

Top 20 Snow Seasons			20 Lowest Snow Seasons			Top 10 Snow Days		
Rank	Snow (inches)	Date	Rank	Snow (inches)	Date	Rank	Snow (inches)	Date
1	194.1	1964-65	1	24.4	1987-88	1	30.6	3-21-48
2	183.6	1975-76	2	30.2	2000-01	2	23.5	2-13-49
3	178.1	1971-72	3	35.5	1986-87	3	20.5	4-2-63
4	175.1	1970-71	4	35.6	1997-98	4	20.2	2-25-57
5	155.1	1955-56	5	41.3	1969-70	5	19.9	12-8-62
6	150.9	1962-63	6	42.6	1952-53	6	19.6	1-15-66
7	149.7	1965-66	7	43.2	1999-00	7	18.9	2-3-93
8	146.6	1994-95	8	46.3	1976-77	8	18.1	4-3-63
9	135.9	1990-91	9	52.4	1977-78	9	17.7	3-9-66
10	131.4	1972-73	10	54.0	1944-45	10	17.1	11-23-94
11	131.3	1948-49	11	54.7	1943-44			
12	131.2	1993-94	12	56.8	1996-97			
13	129.5	1956-57	13	62.0	1953-54			
14	128.7	1958-59	14	62.5	1980-81			
15	124.9	1998-99	15	65.4	1985-86			
16	123.7	1966-67	16	66.2	1983-84			
17	118.9	1973-74	17	68.9	1959-60			
18	118.3	1981-82	18	69.2	1982-83			
19	117.5	1968-69	19	69.7	1949-50			
20	116.0	1989-90	20	71.0	1988-89			



Has Winter Seemed Warmer and Less Snowy Lately?

–By Robert W. Tschantz

Winters over the past 20 years in general have been warmer with less snowfall than the winters from the 1950s through the 1970s. Average temperatures during the winter months (December through February) at the Juneau Airport during the 1981-2000 period averaged 29.1 degrees, while the 1950-1980 period averaged 25.5 degrees. The number of days with below zero temperatures has sharply decreased over the past 20 years. Since 1980, there have been 44 days on which temperatures have been below zero at the Juneau Airport. In the 1970s alone, there were 102 days on which temperatures dropped below zero.

Snowfall has decreased somewhat over the past 20 years on average. During the 20-year period, snowfall at the Juneau Airport averaged 83.3 inches. The previous 30 year period averaged 110.2 inches of snow. On the other hand, overall precipitation (rain and melted snow) has increased somewhat, especially since 1990. The average precipitation during the winter months of the 1990s at the Juneau Airport was 17.51 inches. This is more than 4 inches above the next highest average winter precipitation of any of the previous four decades.

The warmer and less snowy winters are most likely attributed to the frequency of El Niño events in the tropical Pacific Ocean, and the attendant warming of the Gulf of Alaska. The warmer Gulf of Alaska waters modify cold air masses that move in from the western part of Alaska and cross over the Gulf. The showers that occur during these events have more frequently been rain instead of snow due to increased warming of the lower levels of the atmosphere as the airmass crosses the Gulf. Also, cold air that has moved in from the north is modified more quickly when fronts approach from the southwest due to warmer waters offshore, so snow has changed to rain more quickly during these events. Whether the trend of warmer and less snowy winters will continue into the early part of the 21st century is not known at this time. ❄

NEW WIND CHILL CHART

Wind (mph)	Temperature (°F)																	
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes | 10 minutes | 5 minutes

For more information, please see our website and/or the article on wind chill in our fall newsletter.

Co-op Corner: Winter Precipitation Measuring Guidelines

–By Angel Corona

Here in Southeast Alaska, we can get a wide range of precipitation types during the winter months. Observers need to be aware of how to take measurements for the different types of events that occur.

Here are some helpful hints for doing precipitation measurements during the winter.
First, for the B-91 form:

‡ The 24 hr. rain, melted snow etc. is recorded to the nearest hundredth of an inch (ex: 0.21).

‡ The 24 hr. snowfall/frozen precipitation is recorded to the nearest tenth of an inch (ex: 2.1).

‡ The snow/frozen precipitation on the ground is reported to the nearest whole inch (ex: 2).

During the winter months, when snowfall is a possibility, take the funnel and inner tube out of the gage. If you get rain, simply pour it into the inner can and then measure it. If you get snow or any other frozen precipitation, then you need to melt it before measuring. The best way to do this is the following:

1. Put some hot water into the inner tube.
2. Measure how much hot water you put in using the measuring stick.
3. Pour the hot water into the outer can with the snow in it.
4. Mix it around until the hot water has melted the snow.
5. Pour the water into the inner tube with the funnel connected.
6. Measure the total.
7. Subtract the amount of hot

This gives you the 24 hr. amount of water equivalent. Put this value in the same column as rain and report it to the nearest hundredth of an inch.

To get snowdepth, find what you consider a representative area and take about 6 different measurements. Take these measurements and find and average. This is your snowdepth, and is reported to the nearest whole inch.

To get 24 hour snowfall, you will need a snowboard. The best thing to do is put a piece of plywood, approximately 2ft X 2ft (and preferably white), on the ground in an exposed area. Make sure you can find it by putting a flag or something in the ground next to it. Measure directly on the board and report to the nearest tenth of an inch. After measuring, clean off the snowboard and place it on top of the snow so you can get an accurate reading the next time it snows. ❄

(WEB - Cont. from page 3)

Canada, data for individual buoys in Alaska, or data for individual buoys in Canada.

The second area is the Climatology Page. This page allows you to view different climatology products from around Southeast Alaska. A very useful area on this page is the Climate Database Page.

When you select the Climate Database Page, you may view data for specific sites around Southeast Alaska. There is an interactive map on the page from which you select a location. Once a location is selected there are four basic options to choose from. You can view the observed data (as far back as the location record started), records, normals (only a few sites have normals, or averages, assigned to them), or you may search the database on selected fields to get such things as the 5 highest snowfalls or 10 lowest temperatures, etc.

The locations available on this page are the observation sites and cooperative observer sites. The information is updated daily as the data arrives in the Juneau Forecast Office. ❄

To see this newsletter in COLOR please visit our website: http://www.alaska.net/~jnufo

AVALANCHE!

–Articles and photos by John Erben
Southeast Alaska Avalanche Center

They may seem like random "acts of God," but avalanches result directly from observable factors and are largely predictable. Weather, along with terrain and human activity, is a key avalanche trigger.

Teaching people to recognize and avoid avalanche danger is the main role the Southeast Alaska Avalanche Center, an educational nonprofit corporation based in Juneau. The Center's director, Bill Glude, started teaching avalanche courses in Juneau in 1996, after a friend died in an avalanche on Mount Troy. Last year Glude conducted classroom and field classes for 1179 students in Juneau, Haines, Petersberg, Wrangell and Sitka, plus a 100 level course at the University of Alaska Southeast in Juneau.

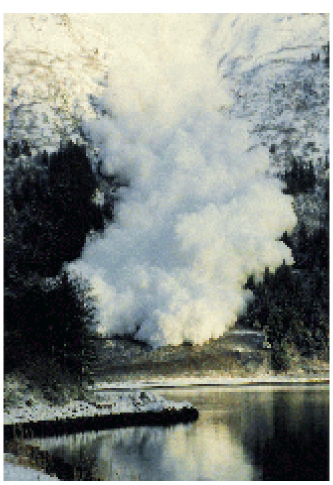
3/02/2001 -- Skiers inspect a four-foot snowpack fracture near Eaglecrest ski area. A skier triggered an avalanche on this spot the previous day and was buried in snow. Another skier spotted his glove protruding from the snow and dug him out, alive.

Alaska now leads the nation in avalanche deaths (23 in the last three seasons), but remains the only western mountain state without federally-funded avalanche education or forecasting. While the Center could produce avalanche forecasts with one more staffer, this would probably require city, state or federal funding.

In the meantime, the Juneau NWS Forecast Office helps out the Avalanche Center with weather data and office space. This year the NWS has also loaned a tower for the Avalanche Center's portable weather station near Eaglecrest.

For more information, contact:

Southeast Alaska Avalanche Center
PO Box 22316
Juneau, Alaska 99802
(907) 586-5699 office & fax
e-mail: seakaval@alaska.net
web: www.avalanche.org
<http://www.avalanche.org>



Debris cloud over Thane Road, Juneau, Alaska.

Hikers at the top of Eaglecrest Ski Area, Juneau, Alaska.